

1 124. A method of determining one of a movement direction, spin rate, and spin axis
2 orientation of an object, the object having a movement path section that is substantially non-
3 curvilinear, comprising the steps of:
4 a) aligning a plurality of electro-magnetic energy transmission paths to be non-parallel to the
5 object's substantially non-curvilinear movement path section;
6 b) reflecting electro-magnetic energy from each of the plurality of transmission paths off the
7 object for at least a portion of the substantially non-curvilinear movement path section;
8 c) receiving the electro-magnetic energy reflected off the object from each of the plurality of
9 transmission paths; and
10 d) determining one of a movement direction, spin rate, and spin axis orientation of the
11 object based on the reflected electro-magnetic energy received from each of the plurality
12 of transmission paths and while the object was traveling in the at least a portion of the
13 substantially non-curvilinear movement path section.

1 125. The method of determining one of a movement direction, spin rate, and spin axis
2 orientation of an object of claim 124, further comprising the step of applying an electro-
3 magnetic contrasting mark to the object.

1 126. The method of determining one of a movement direction, spin rate, and spin axis
2 orientation of an object of claim 124, further comprising the step of applying a symmetrically
3 shaped electro-magnetic contrasting mark to the object.

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1 127. The method of determining a movement characteristic of an object of claim 124,
2 wherein the object is a golf ball and the substantially non-curvilinear movement path section
3 is located within several feet of the location of where the golf ball is struck.

1 128. The method of determining a movement characteristic of an object of claim 125,
2 wherein the plurality of transmission paths includes at least two transmission paths.

1 129. The method of determining a movement characteristic of an object of claim 125,
2 wherein the plurality of transmission paths includes at least three transmission paths.

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1 130. A method of determining one of the spin rate and spin axis orientation of a
2 moving object, the object having a movement path section, comprising the steps of:
3 a) applying an electro-magnetic contrasting mark to the object;
4 b) aligning a plurality of electro-magnetic energy transmission paths to be non-parallel to the
5 object's movement path section;
6 c) reflecting electro-magnetic energy off the object from the plurality of electro-magnetic
7 energy transmission paths;
8 d) receiving the electro-magnetic energy reflected off the object from the plurality of electro-
9 magnetic energy transmission paths; and
10 e) determining one of the spin rate and spin axis orientation of the object based on the
11 received electro-magnetic energy from the plurality of electro-magnetic energy
12 transmission paths.

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1 131. The method of determining one of the spin rate and spin axis orientation of the
2 object of claim 130, wherein step a) includes applying a symmetrically shaped electro-
3 magnetic contrasting mark to the object.

C 1 132. The method of determining one of the spin rate and spin axis orientation of the
2 object of claim 130, wherein step a) includes applying a plurality of electro-magnetic
3 contrasting marks to the object.

1 133. The method of determining one of the spin rate and spin axis orientation of the
2 object of claim 130, wherein step a) includes applying a plurality of symmetrically shaped
3 electro-magnetic contrasting marks to the object.

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1 134. An apparatus for determining one of a movement direction, spin rate, and spin
2 axis orientation, comprising:

3 a) a moving object, the object having a movement path section that is substantially non-
4 curvilinear;

5 b) a plurality of sensors, each sensor having an electro-magnetic energy transmission path
6 that is aligned to be non-parallel to the object's substantially non-curvilinear movement
7 path section, each sensor reflecting electro-magnetic energy along its transmission path
8 off the object for at least a portion of the substantially non-curvilinear movement path
9 section, and each sensor receiving electro-magnetic energy reflected off the object; and

c) means for determining one of a movement direction, spin rate, and spin axis orientation
11 of the object based on the electro-magnetic energy received at each of the plurality of
12 sensors while the object was traveling in the at least a portion of the substantially non-
13 curvilinear movement path section.

1 135. The apparatus for determining one of a movement direction, spin rate, and spin
2 axis orientation of claim 134, wherein the object includes an electro-magnetic contrasting
3 mark.

1 136. The apparatus for determining one of a movement direction, spin rate, and spin
2 axis orientation of claim 134, wherein the object is a golf ball and the substantially non-
3 curvilinear movement path section is located within several feet of the location of where the
4 golf ball is struck.

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1 137. The apparatus for determining one of a movement direction, spin rate, and spin
2 axis orientation of claim 135, wherein the plurality of sensor includes at least three sensors.

1 138. An apparatus for determining one of a spin rate and spin axis orientation,
2 comprising:

3 a) a moving object, the object having a movement path section;

4 b) a plurality of sensors, each sensor having an electro-magnetic energy transmission path
5 that is aligned to be non-parallel to the object's movement path section, each sensor
6 reflecting electro-magnetic energy along its transmission path off the object for at least a
7 portion of the movement path section, and each sensor receiving electro-magnetic energy
8 reflected off the object; and

9 c) means for determining one of the spin rate and spin axis orientation of the object based on
10 the electro-magnetic energy received at each of the plurality of sensors.

1 139. The apparatus for determining one of a spin rate and spin axis orientation of claim
2 138, wherein the object includes an electro-magnetic contrasting mark.

1 140. The apparatus for determining one of a spin rate and spin axis orientation of claim
2 139, wherein the plurality of sensor includes at least three sensors.

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1 141. (Amended) A ball adapted for determination of one of the ball's movement
2 direction, spin rate, and spin axis orientation, comprising:

3 a symmetrically shaped area having a electro-magnetic contrast different
4 from the ball remainder, the area configured to enable the determination of a three
5 dimensional velocity vector for the ball ~~one of the ball's movement direction,~~
6 ~~spin rate, and spin axis orientation~~ based on electro-magnetic energy reflected off
7 the ball from a plurality of transmission paths and one of the ball's movement
8 direction, spin rate, and spin axis orientation based on the three dimensional
9 velocity vector.

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1 142. (Deleted).

1 143. The ball adapted for determination of one of the ball's movement direction, spin
2 rate, and spin axis orientation of claim ~~142~~141, wherein the plurality of areas have a circular
3 shape.

1 144. (Deleted).

1 145. (Deleted).

1 146. (Deleted).

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1 147. (Newly Added) A method of determining one of a movement direction, spin rate,
2 and spin axis orientation of an object, the object having a movement path, comprising the
3 steps of:
4 a) reflecting electro-magnetic energy from a plurality of transmission paths off the object for
5 at least a portion of movement path section;
6 b) receiving the electro-magnetic energy reflected off the object from each of the plurality of
7 transmission paths; and
8 c) determining a three dimensional velocity vector for the object;
9 d) determining one of a movement direction, spin rate, and spin axis orientation of the
C1 10 object based on the three dimensional velocity vector.

1 148. (Newly Added) The method of determining one of a movement direction, spin
2 rate, and spin axis orientation of an object of claim 147, further comprising the step of
3 applying an electro-magnetic contrasting mark to the object.

1 149. (Newly Added) The method of determining a movement characteristic of an
2 object of claim 147, wherein the object is a golf ball and the movement path section is
3 located within several feet of the location of where the golf ball is struck.

1 150. (Newly Added) The method of determining a movement characteristic of an
2 object of claim 148, wherein the plurality of transmission paths includes at least two
3 transmission paths.

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